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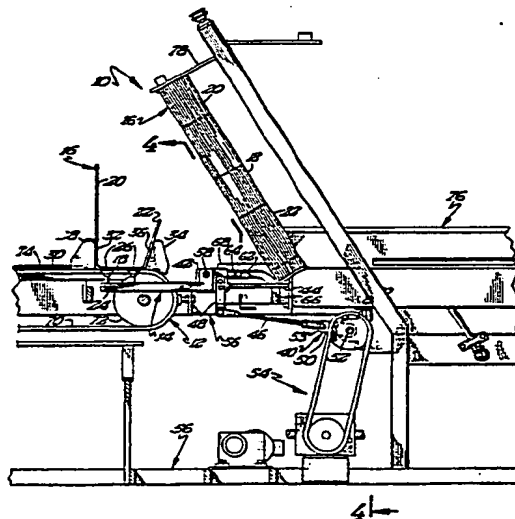
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US88/01764 <b>(22) International Filing Date:</b> 26 May 1988 (26.05.88) <b>(31) Priority Application Number:</b> 053,781 <b>(32) Priority Date:</b> 26 May 1987 (26.05.87) <b>(33) Priority Country:</b> US  <b>(71) Applicant (for all designated States except US):</b> APV DOUGLAS MACHINE CORPORATION [US/US]; 3404 Iowa Street, Alexandria, MN 56308 (US). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only) :</b> PAZDERNIK, Irvan, L. [US/US]; Rural Route 3, Box 270, Alexandria, MN 56308 (US).  <b>(74) Agents:</b> KAMRATH, Alan et al.; Peterson, Wicks, Nemer & Kamrath, 1407 Soo Line Building, Minneapolis, MN 55402 (US).		<b>(81) Designated States:</b> AT, AT (European patent), AU, BB, BE (European patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE (Utility model), DE (European patent), DK, FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent), US.  <b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>  <p style="font-size: 1.5em; font-family: cursive;">≈ US 4,917,663</p>

**(54) Title:** PACKAGING MACHINE WITH DIRECT BLANK SETUP

**(57) Abstract**

A packaging machine and more particularly a machine for setting up a container from a blank (16) of corrugated board is disclosed as including a uniquely arranged magazine (10) for a plurality of container blanks (16) of corrugated board and including a structure to directly set up the shape of the container in a controlled manner for enabling a product to be easily loaded and for subsequent processing by the packaging machine. The unique direct setup arrangement utilizes arcuately moving arms (24) with vacuum cups (26) thereon which attach themselves to a blank (16) in the magazine (10) and move through an arc of less than 90° from a vertically inclined position to a generally horizontal position. The arms (24) and blank (16) are then moved horizontally so that the side edge portions of the major flap (18) of the blank (16), such as the bottom flap, are positioned under horizontal flap guides (74). The major flap (18) of the container is also positioned between upstanding lugs (28, 34) on a horizontal chain conveyor assembly (12) in order to orient the container flaps (20, 22) connected to the major flap (18) in perpendicular relation to the major flap (18). Thus, a partially formed container moves in a horizontal path with the chain conveyor assembly (12) for loading products into the partially formed container and for subsequently processing the container to form a package.



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1           PACKAGING MACHINE WITH DIRECT BLANK SETUP

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

          The present invention generally relates to a  
5   packaging machine and more particularly a machine for  
      setting up a container from a blank of corrugated board.  
      Specifically, the packaging machine includes a uniquely  
      arranged magazine for a plurality of container blanks of  
      corrugated board and includes a structure to directly set  
10   up the shape of the container in a controlled manner for  
      enabling a product to be easily loaded and for subsequent  
      processing by the packaging machine. The unique direct

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1 setup arrangement utilizes arcuately moving arms with  
vacuum cups thereon which attach themselves to a blank in  
the magazine and move through an arc of less than 90°  
from a vertically inclined position to a generally  
5 horizontal position. The arms and blank are then moved  
horizontally so that the side edge portions of the major  
flap of the blank, such as the bottom flap, are  
positioned under horizontal flap guides. The major flap  
of the container is also positioned between upstanding  
10 lugs on a horizontal chain conveyor assembly in order to  
orient the container flaps connected to the major flap in  
perpendicular relation to the major flap. Thus, a  
partially formed container moves in a horizontal path  
with the chain conveyor assembly for loading products  
15 into the partially formed container and for subsequently  
processing the container to form a package.

#### INFORMATION DISCLOSURE STATEMENT

Packaging machines to set up a container or box blank  
from its planar condition to a partially setup condition  
20 for receiving products and for further processing to  
complete the packaging is a well-known technique  
utilizing rather complex mechanical structures for  
controlling the flaps of the container for maintaining  
them in requisite position during the packaging process.  
25 Known devices feed one blank at a time from a supply  
stack, magazine or the like usually by moving the blank  
arcuately, 180° in some instances, and setting up and  
controlling the flaps by the use of cams, cam followers  
and the like. None of the prior art known to applicant  
30 utilizes arms which swing in an arc less than 90° to move  
the blank from a magazine to a position with the major  
flap received between pairs of projecting lugs on a chain  
conveyor assembly and which also move in a horizontal  
direction to move the blank so that the side edge  
35 portions of the major flap of the container are received  
under horizontal flap guides alongside the chain conveyor  
assembly.

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SUMMARY OF THE INVENTION

An object of the present invention is to provide a packaging machine which forms a corrugated container blank from a flat, planar condition into a partially formed and accurately controlled shape for subsequent loading with product, either by hand or by subsequent portions of the packaging machine, and possibly for further processing to form a complete package, with the corrugated blanks being disposed in a vertically inclined magazine and moved directly from the magazine to a partially set up condition in a chain conveyor assembly.

Another object of the invention is to provide a packaging machine in which the magazine for the corrugated blanks is disposed in a generally vertical but inclined position oriented at a height generally the same as the upper flight of the chain conveyor assembly in order to enable the magazine to be more easily loaded with container blanks. The forwardly inclined angle of the magazine and blanks eliminate the necessity for a follower behind the blanks in order to keep them in position for movement by the arcuately moving arms to the horizontally oriented chain conveyor assembly.

A further object of the invention is to provide a packaging machine in accordance with the preceding objects in which the blank setup device includes arcuately moving arms having vacuum cups on the ends thereof which are moved toward a blank in the magazine and become attached to the blank for downward swinging movement in an arc less than 90° from the forwardly inclined position in the magazine to a generally horizontal position with the major flap of the container blank being moved downwardly between spaced pairs of upwardly projecting lugs on the chain conveyor assembly and with the arms simultaneously also moving horizontally to insert the outer side edge portions of the major flap of the blank container under flap guides extending

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1 horizontally alongside the chain conveyor assembly in  
order to gain and maintain complete control of the blank  
as it is set up and which enables the elapse of less time  
in each cycle of operation thereby increasing the  
5 efficiency of the packaging machine.

Still another object of the invention is to provide a  
packaging machine in accordance with the preceding  
objects in which the vacuum cup arms of the setup device  
are mechanically driven by a crank which not only moves  
10 the arms in an arcuate manner but also moves the arms  
horizontally on linear bearings. The arc of rotation of  
the arms is produced by cam followers moving in radiused  
tracks on opposite sides of the machine. Thus, accurate  
and positive control of all moving components and the  
15 corrugated container blanks is maintained as the blanks  
are moved from the magazine onto the conveyor chain  
assembly, with the blank being partially set up and  
accurately controlled for subsequent processing by the  
machine.

20 These together with other objects and advantages  
which will become subsequently apparent reside in the  
details of construction and operation as more fully  
hereinafter described and claimed, reference being made to  
the accompanying drawings forming a part hereof, wherein  
25 like numerals refer to like parts throughout.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1A-D are progressive, schematic side  
elevational views illustrating the major components of a  
packaging machine according to the teachings of the  
30 invention removing a blank from a magazine and partially  
setting up the blank to a condition for receiving  
products or items to be packaged.

Figure 2 is a side elevational view of the magazine  
and blank setup device according to the teachings of the  
35 present invention.

Figure 3 is a plan view of the blank setup device of



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1 Figure 2.

Figure 4 is a sectional view of the blank setup device of Figure 2 according to section line 4-4 of Figure 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

5 Referring now specifically to the drawings, Fig. 1 illustrates schematically the association and operation of the unique components of the present invention including a magazine generally designated by reference numeral 10 which is supported in vertically inclined  
10 position with the upper end being inclined toward a chain conveyor assembly 12 and including an arm assembly 14 which moves corrugated container or box blanks 16 from the magazine 10 onto the chain conveyor assembly 12. The box blank 16 is of planar construction before it is set  
15 up and includes a major flap 18 which may be the bottom of the container and additional flaps 20 and 22 which are moved from their initial position in the same plane as the major flap 18 to a position perpendicular thereto as shown in Figs. 1C and 1D.

20 The arm assembly 14 includes arms 24 having vacuum cups 26 attached thereto which move toward and become attached to the major flap 18 of the corrugated blank 16, with the arms 24 then rotating or moving in an arcuate path downwardly from their initial position in Fig. 1A to  
25 the positions illustrated in Figs. 1B and 1C. The arms 24 move downwardly in an arcuate path through an arc of movement of less than 90° from the vertically inclined position of Fig. 1A to the horizontal position of Fig. 1C. As the arms 24 move downwardly in an arcuate manner and  
30 remove the blank 16 from the magazine 10, the minor flap 20 is deformed upwardly in relation to the major flap 18. As the arms 24 reach a horizontal position, they are moved forwardly or in the direction of the chain conveyor assembly 12 so that the flap 20 comes into engagement  
35 with a leading projection or lug 28 mounted on the upper flight 30 of the chain conveyor assembly 12 which has a

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1 substantially vertical trailing edge 32. Trailing edge  
32 of the lug 28 orients the flap 20 in perpendicular  
relation to the flap 18 as the blank 16 is moved toward  
the surface 32 of the lug 28. A trailing lug 34 having a  
5 vertical edge surface 36 facing the edge 32 of the lug 28  
trails the lug 28, with lugs 28 and 34 operating in pairs  
so that the vertical edge 36 of the trailing lug 34 will  
contact and pivot the flap 22 upwardly into perpendicular  
relation to the flap 18 as illustrated in Figs. 1C and 1D.  
10 At the same time that the arms 24 and suction cups 26  
are moving horizontally to bring the flap 20 into  
engagement with the edge 32 of the lug 28, it moves the  
blank 16 longitudinally and horizontally so that the side  
edge portions of the major flap 18 are received under  
15 longitudinally extending flap guides in the form of  
continuous flanges 74 mounted alongside of the chain  
conveyor assembly 12 thus maintaining control of the  
major flap 18. As soon as the side edge portions of the  
major flap 18 are received under and guided by the guide  
20 flanges 74 and the edges 32 and 36 of the lugs 28 and 34,  
respectively, engage the flaps 20 and 22 to orient the  
flaps 20 and 22 vertically in relation to the horizontal  
major flap 18, the blank 16 is then under complete  
control for movement along the chain conveyor assembly 12  
25 for further processing by introducing products or other  
items to be packaged which can be easily moved laterally  
onto the upper surface of the major flap 18 by the  
machine or the products or items to be packaged can be  
manually placed in the partially set up container. The  
30 arm assembly 14 then returns toward the magazine 10 for  
attachment to another blank 16 for repeat of the cycle.  
As illustrated in Fig. 2, the arms 24 are supported  
from a slide block 42 that slides on a linear bearing 44  
in the form of an elongated rod. The slide block 42 is  
35 connected to a connecting rod 46 through an offset  
bracket 48. The connecting rod 46 is connected to a

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1 crank 50 rotatable about an axis defined by shaft 52.  
The crank 50 and connecting rod 46 are connected at pivot  
point 53 so that upon rotation of the shaft 52, the  
connecting rod 46 will cause the slide block 42 to  
5 reciprocate horizontally on the linear bearing rod 44.  
The shaft 52 is driven to reciprocate the slide block 42  
and thus the arms 24 by a belt or chain drive assembly 54  
that is supported on a framework structure 56 provided  
with a suitable motor, reduction gear and drive  
10 arrangement. The slide block 42 includes a transverse  
pivot shaft 58 on which the arms 24 are secured which  
enables the arms 24 to pivot about an axis defined by the  
shaft 58. A pair of roller-type cam followers 64 are  
mounted on laterally extending brackets 62 provided on  
15 the ends of the shaft 58. The cam followers 64 move in a  
radiused cam track 66 in a plate or other supporting  
structure 68. Thus, as the slide block 42 reciprocates  
forwardly, the cam followers 64 moving in the cam tracks  
66 will move the arms 24 arcuately downwardly from the  
20 position illustrated in Fig. 1A to the generally  
horizontal position illustrated in Fig. 1C when the cam  
followers 64 are in the arcuate portions of the radiused  
cam tracks 66 about the axis defined by the shaft 58 and  
then also move them horizontally forward when both of the  
25 cam followers 64 are in the horizontal portion of the  
radiused cam tracks 66. Then, by occluding the source of  
vacuum connected to the vacuum cups 26 in order to  
release the arms 24 from the major flap 18, as slide  
block 42 reciprocates rearwardly, the cam followers 64  
30 moving in the cam track 66 will move the arms 24  
horizontally rearward toward the magazine 10 when both of  
the cam followers 64 are in the horizontal portions of the  
radiused cam tracks 66 and then upwardly in an arcuate  
manner when the cam followers 64 are in the arcuate  
35 portions of the radiused cam tracks 66 so that the vacuum  
cups 26 again become attached to the next blank 16 when

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1 the source of vacuum is again connected with the vacuum  
cups 26. The position of the followers 64 in the cam  
tracks 66 is illustrated in Figs. 1A-D and the position  
of the lugs 28 and 34 during the movement of the arms 24  
5 during various stages of the cycle of movement of the  
blank 16 is also shown.

The chain conveyor assembly 12 includes two pairs of  
adjacent conveyor chains 70 entrained over end sprocket  
gears 72 journaled from side members of the framework 56  
10 with the upper flight 30 of the conveyor chain 70  
underlying the major flap 18 of the blank 16 as  
illustrated in Fig. 2. Also, the framework 56 includes  
the pair of flap guides 74 which extend alongside and are  
spaced outwardly slightly from the outermost upper chain  
15 conveyor flights 30 with the flap guides 74 overlying and  
controlling the position of the side edge portions of the  
major flap 18. Specifically, the flap guides 74 extend  
through and are received in inwardly extending slots  
formed in the side edge portions of the blank 16 at the  
20 juncture between the major flap 18 and flaps 20 and 22  
thus gaining control of the blank 16 and maintaining  
control of the blank 16 as it moves from its setup  
position to a point on the machine for receiving the  
product or items to be packaged. The terminal end of the  
25 flap guide 74 is oriented generally in alignment with the  
inner periphery of the sprocket gears 72 so that the  
leading edge of the side edge portions of the major flap  
18 will be inserted under the guide flaps or flanges 74  
while the suction cups 26 still hold the major flap 18  
30 downwardly against the upper flight 30 of the conveyor  
chains 70 as illustrated in Fig. 2 and at which point the  
lugs 32 and 34 have also completely partially formed the  
blank 16 into a container. The suction to the suction  
cups 26 can then be released in a known manner so that  
35 the arms 24 can move horizontally outwardly toward the  
magazine 10 until the cam followers 64 remote from the

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1 arms 24 engage the radiused and vertical portion of the  
cam tracks 66 and again pivot arms 24 upwardly to attach  
the suction cups 26 to the next blank 16 when vacuum is  
again communicated with the suction cups 26. The vacuum  
5 cups 26 may be solid so that the vacuum cups 26 can  
attach to the blank 16 without communicating any source  
of suction with them and also separated from the major  
flap 18 by sliding movement off of the bottom surface of  
the major flap 18 as the blank 16 moves with the conveyor  
10 chain assembly 12 and as the arms 24 move away from the  
conveyor chain assembly 12. As the partially formed  
container moves down the conveyor chain assembly 12,  
additional procedures are performed which do not  
constitute part of the present invention. These  
15 additional procedures include the positioning of items  
into the partially set up container either automatically  
by machine or manually with the container blank 16 then  
being completely formed into a container and closed in a  
manner to form a package.

20 The magazine 10 is fed by a feed conveyor assembly 76  
which feeds the blanks 16 in vertical position into the  
inclined magazine 10. Magazine 10 includes a frame  
structure 78 supported in a suitable manner and having a  
bottom flange and top flange which engage and temporarily  
25 retain the top and bottom edges of the blank 16. Thus,  
the planar blank 16 when engaged by the suction cups 26  
will break at the previously formed score lines between  
the major flap 18 and the flaps 20 and 22. The score  
lines terminate in the inwardly extending slots or  
30 notches through which the flap guides 74 extend. The  
side edge portions of the flaps 18, 20, and 22 may be  
folded inwardly and a top flap closed to form a complete  
package in the machine.

The essential component of the present invention  
35 reside in the magazine 10 and the setup device so that a  
supply of container blanks 16 can be formed into a

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1 predetermined shape in an efficient manner due to the  
particular inclined construction of the magazine 10 and  
the movement characteristics of the arms 24 and suction  
cups 26 and the relationship of the forming lugs 28 and  
5 34 on the chain conveyor assembly 12. The magazine 10  
eliminates the necessity of a follower since the inclined  
construction thereof will retain the blanks 16 in  
position for engagement by the suction cups 26 and  
enables the supply conveyor 76 to be loaded with blanks  
10 16 in an efficient manner since the magazine 10 and  
supply conveyor 76 therefor is generally at the same  
height as the chain conveyor assembly 12. Another  
essential feature of the invention is the combined  
arcuate and horizontal movement of the arms 24 with  
15 vacuum cups 26 thereon for moving blanks 16 singly into a  
position along the top surface of the upper flight 30 of  
conveyor chains 70 having shaping lugs 28 and 34 arranged  
thereon in pairs. The lugs 28 and 34 of each pair are  
spaced to engage the blank 16 to partially form the blank  
20 16 into a controlled shape with the side edge portions of  
the major flap 18 or bottom of the blank 16 being  
inserted under longitudinal flap guides 74 while still  
under the control of the arms 24 and vacuum cups 26.  
Positive and accurate control of the blank 16 is thereby  
25 maintained at all times from the magazine 10 until the  
blank 16 is loaded with product or items to be packaged.

The foregoing is considered as illustrative only of  
the principles of the invention. Further, since numerous  
modifications and changes will readily occur to those  
30 skilled in the art, it is not desired to limit the  
invention to the exact construction and operation shown  
and described, and, accordingly, all suitable  
modifications and equivalents may be resorted to, falling  
within the scope of the invention.

## CLAIMS:

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1. Packaging machine for partially forming a planar blank into a container, with the blank including at least a major flap and a first flap extending a length from the major flap, comprising, in combination: a magazine supporting a plurality of blanks; a first lug having an edge; an arm assembly; means formed on the arm assembly for removable attachment to the major flap of the blank; means for moving the arm assembly in an arcuate path between a first position with the removable attachment means positioned adjacent the magazine for attachment to the blank from the magazine and a second position with the major flap being generally perpendicular to and spaced from the edge of the lug a distance less than the length of the first flap and with the first flap abutting with the lug and for moving the major flap between the second position and a third position in a direction generally perpendicular to the edge of the lug; and means for holding the major flap relative to the lug with the first flap generally perpendicular to the major flap.

2. The packaging machine of claim 1 further comprising, in combination: means for conveying the blank along a path generally parallel to and in the direction of the arm assembly movement from the second position to the third position, with the first lug being formed on the conveying means with the edge generally perpendicular to the conveying means; and wherein the holding means comprises a second lug formed on the conveying means and having an edge generally perpendicular to the conveying means and generally parallel to the edge of the first lug.

3. The packaging machine of claim 2 wherein the major flap includes side edge portions; and wherein the packaging machine further comprises, in combination: means for engaging the side edge portions of the major flap of the blank when the blank attached to the arm assembly is intermediate the second and third positions of

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the arm assembly to retain control of the blank for movement in the conveying means after release from the arm assembly.

4. The packaging machine of claim 3 wherein the engaging means comprises guide flanges generally parallel to the conveying means.

5. The packaging machine of claim 2 wherein said magazine is oriented in a vertically inclined position having an upper end inclined toward the arm assembly so that the blanks in the magazine will be retained in a position for engagement by the removable attachment means without the use of blank followers.

6. The packaging machine of claim 5 wherein said magazine includes a feed conveyor for vertically oriented blanks which enter the inclined magazine, with the feed conveyor and magazine being oriented at a height generally coincident with the height of the conveying means to facilitate loading of blanks in the feed conveyor.

7. The packaging machine of claim 1 wherein the arm assembly moving means comprises, in combination: a slide block; means for pivotably mounting the arm assembly relative to the slide block; means for moving the slide block between a first position and a second position; and means for pivoting the arm assembly relative to the slide block dependent on the position of the slide block.

8. The packaging machine of claim 7 wherein the arm assembly pivoting means comprises, in combination: a cam track, with the slide block being movable relative to the cam track; and a cam follower connected to the arm assembly for engaging the cam track.

9. The packaging machine of claim 8 wherein the slide block is movable in a direction generally perpendicular to the edge of the first lug; and wherein the cam track includes a radiused curved portion to move the arm assembly between its first position and its second position and includes a straight portion generally



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perpendicular to the edge of the first lug to move the arm assembly between its second position and its third position.

10. The packaging machine of claim 9 wherein the slide block moving means comprises, in combination: an elongated rod, with the slide block being slideably mounted on the elongated rod; and means for reciprocating the slide block on the elongated rod.

11. The packaging machine of claim 10 wherein the reciprocating means comprises, in combination: a driven crank assembly and a connecting rod connecting the crank assembly with the slide block to slide the slide block along the elongated rod.

12. The packaging machine of claim 1 wherein the blank includes a second flap extending from the major flap, with the major flap being intermediate the first and second flaps; and wherein the holding means comprises means for moving the second flap relative to the major flap until the second flap is generally perpendicular to the major flap and parallel to and opposite the first flap.

13. The packaging machine of claim 1 wherein the removable attachment means comprises vacuum cups formed on the arm assembly.

14. Method for partially forming a planar blank into a container, with the blank including a major flap and a first flap extending a length from the major flap, comprising the steps of:

- a) attaching to the major flap of the blank;
- b) moving the major flap of the blank into a position generally perpendicular to and spaced less than the length of the first flap from an edge of a lug, with the first flap abutting with the lug;
- c) moving the major flap in a first direction toward and generally perpendicular to the edge of the lug until the first flap is generally perpendicular to the major flap;

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- d) holding the major flap against the lug with the first flap generally perpendicular to the major flap; and
- e) releasing the attachment of the major flap.

15. The method of claim 14 further comprising the step of: conveying the major flap in the first direction on a conveyor, with the lug being formed on the conveyor.

16. The method of claim 15 wherein the step of holding the major flap comprises the step of providing a second lug on the conveyor for abutting with the major flap, with the second lug being spaced from the first lug.

17. The method of claim 16 wherein the blank includes a second flap extending from the major flap, with the major flap being intermediate the first and second flaps; and wherein the step of holding the major flap comprises the step of moving the second flap relative to the major flap until the second flap is generally perpendicular to the major flap and parallel to and opposite the first flap.

18. The method of claim 15 wherein the major flap includes side edge portions, and wherein the method further comprises the step of engaging the side edge portions of the major flap prior to releasing the attachment of the major flap to retain control of the blank on the conveyor.

19. The method of claim 14 wherein the step of attaching to the major flap of the blank comprises the step of attaching the major flap of the blank to an arm assembly; wherein the step of moving the major flap of the blank with the first flap abutting with a lug comprises the step of moving the arm assembly in an arcuate path; and wherein the step of moving the major flap in a first direction comprises the step of moving the arm assembly in the first direction.

20. Method of retaining control of a container blank along a conveyor assembly in a packaging machine, with the blank including a major flap having side edge portions, with the conveyor assembly including an upper flight

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moving in a first direction, with the conveyor assembly including longitudinally extending flap guides alongside the conveyor assembly to overlies the side edge portions of the major flap, with the longitudinally extending flap guides having terminal ends, comprising the steps of:

a) attaching the major flap of the blank to an arm assembly;

b) moving the arm assembly in an arcuate path from a first position to a second position, with the major flap of the blank attached to the arm assembly being positioned on the upper flight of the conveyor assembly spaced from the terminal ends of the longitudinally extending flap guides in the second position;

c) moving the arm assembly in the first direction from the second position to a third position, with the side edge portions of the major flap of the blank attached to the arm assembly being inserted under the longitudinally extending flap guides in the third position; and

d) releasing the major flap of the blank from the arm assembly when the arm assembly is in its third position for movement with the conveyor assembly in the first direction.

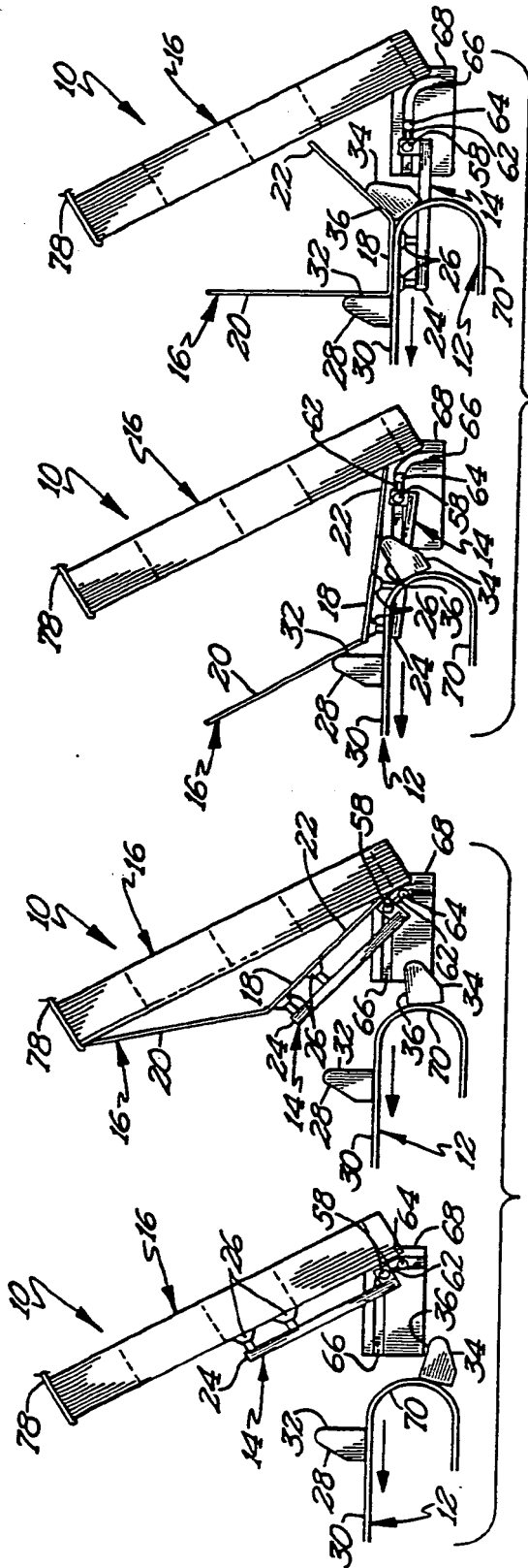


Fig 1B

Fig 1A

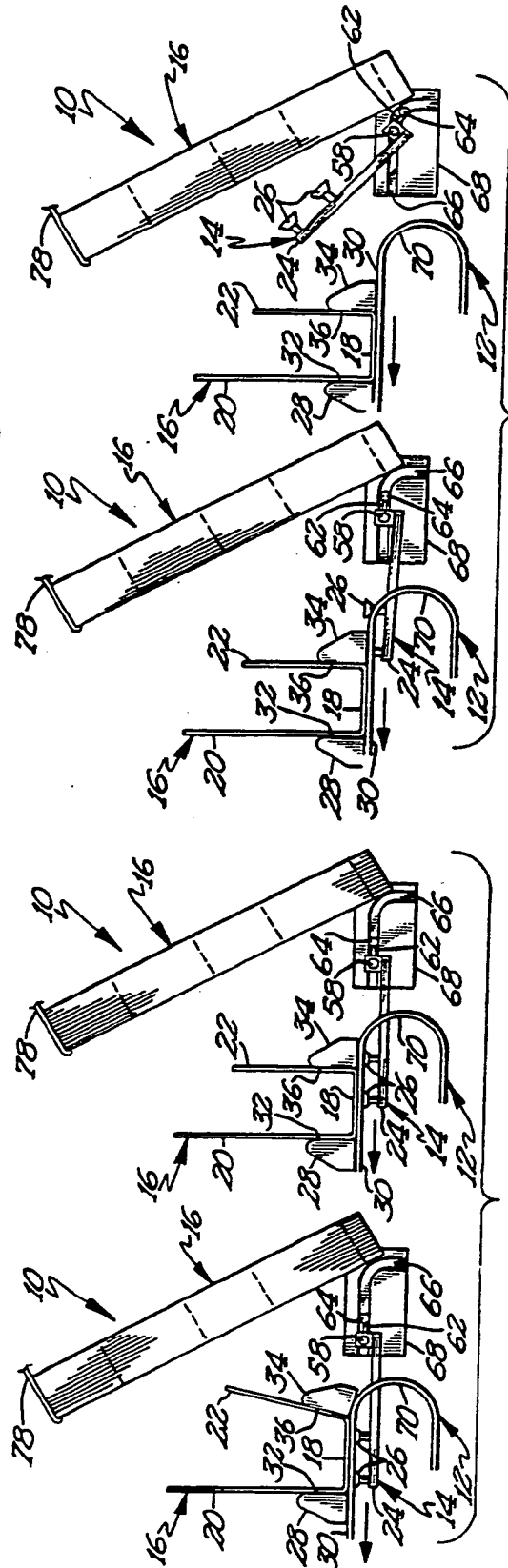


Fig 1C

Fig 1D

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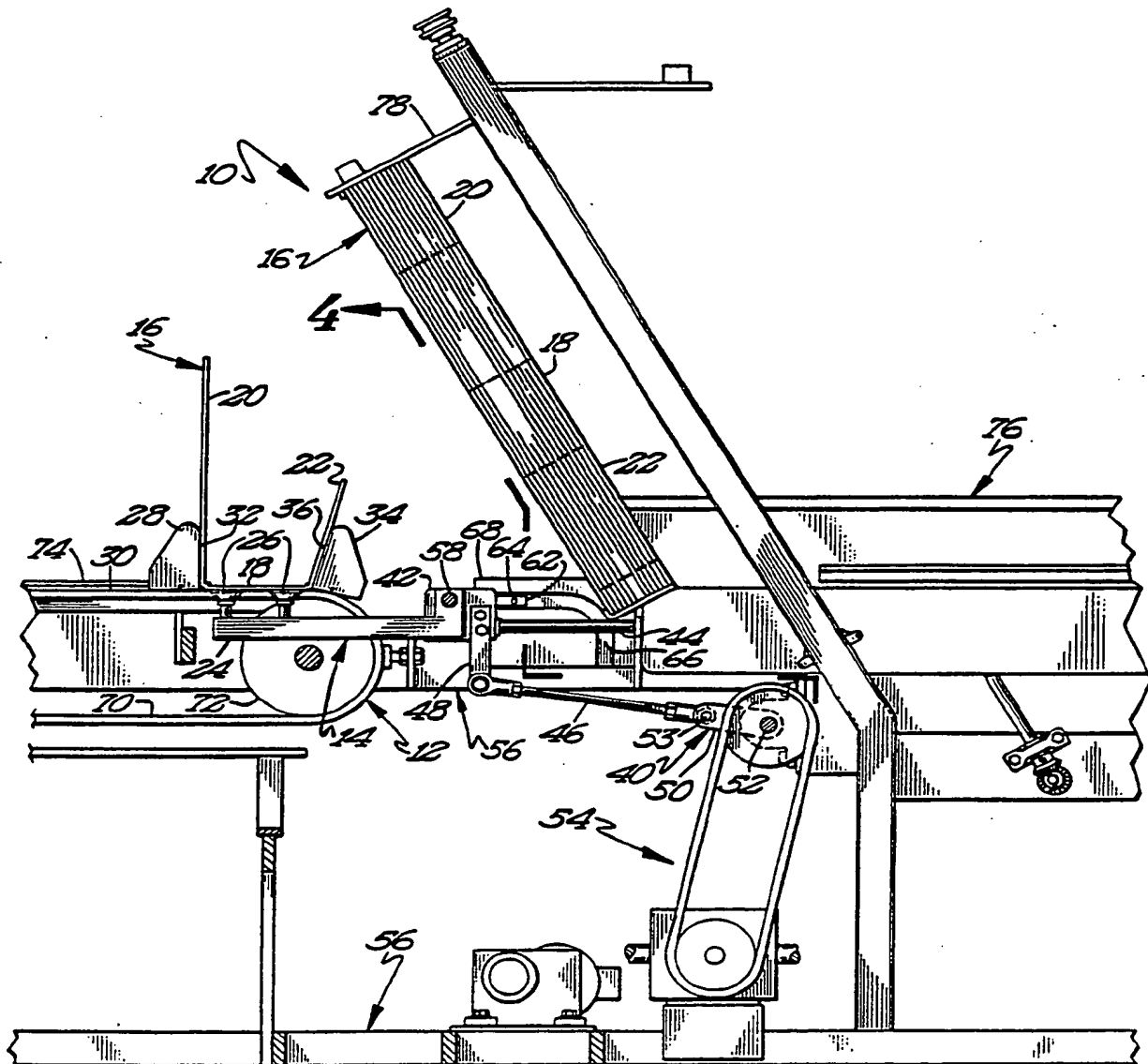
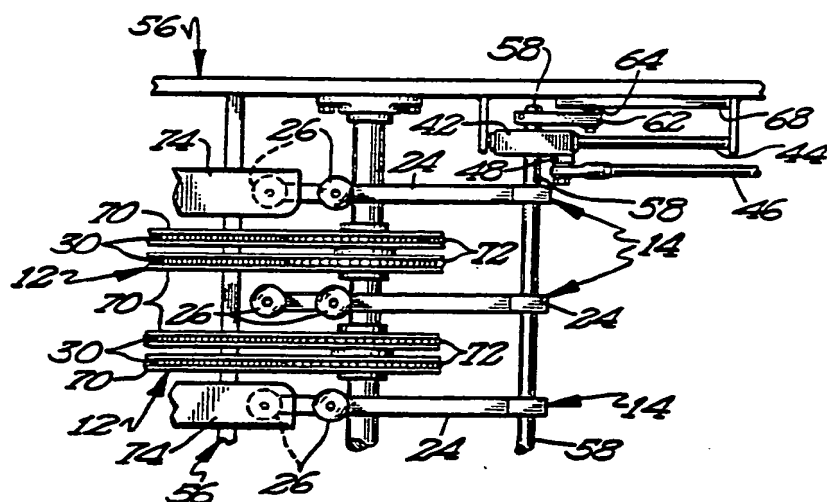


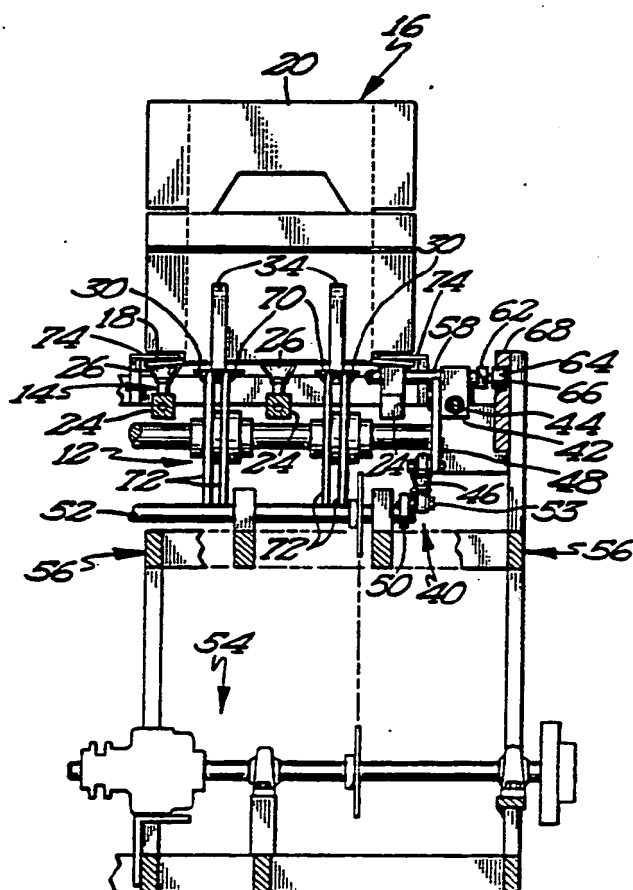
Fig 2

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**Fig 3**



**Fig 4**

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 88/01764

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) <sup>4</sup>

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC<sup>4</sup>: B 65 B 43/26; B 65 B 43/18

## II. FIELDS SEARCHED

### Minimum Documentation Searched <sup>7</sup>

Classification System I

Classification Symbols

IPC<sup>4</sup>

B 65 B

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>

## III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup>

Category <sup>9</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	DE, A, 2938754 (E. BAUER) 2 April 1981, see page 19, last-paragraph - page 21, last paragraph; figures 1,7	1,2,5,7,8, 10,11,13- 16,19,20
A	--	3
A	US, A, 3127027 (R. ROSER) 31 March 1964, see figures 2-9	1,19,14
A	--	
A	US, A, 4548025 (R. HEISLER) 22 October 1985, see figure 1B	1,14
A	--	
A	US, A, 3420037 (F. VILLEMURE) 7 January 1969, see column 8, lines 17-57	3
A	--	
A	CH, A, 468907 (AMERICAN CAN CO.) 15 April 1969, see column 5, lines 50-60	6
A	--	
A	GB, A, 1152321 (JACOB, WHITE & CO.) 14 May 1969, see page 3, lines 30-42	9
A	--	
A	FR, A, 2373449 (SUNDPACMA AB) 7 July 1978, see figure 5	12,17
	--	

<sup>9</sup> Special categories of cited documents: <sup>10</sup>

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

## IV. CERTIFICATION

Date of the Actual Completion of the International Search

15th September 1988

Date of Mailing of this International Search Report

07 OCT 1988

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

*[Signature]* P.C.G. VAN DER PIJLTEN

## III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
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A	US, A, 2171131 (M. MILMOE) 29 August 1939	
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A	FR, A, 2162900 (THE MEAD CORP.) 20 July 1973	
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# ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

US 8801764  
SA 22720

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 28/09/88. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 2938754	02-04-81	None	
US-A- 3127027		None	
US-A- 4548025	22-10-85	None	
US-A- 3420037	07-01-69	None	
CH-A- 468907		NL-A- 6707427	22-04-68
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		DE-A- 1561953	23-04-70
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GB-A- 1152321	14-05-69	None	
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